The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

VOL. L
No. 1285

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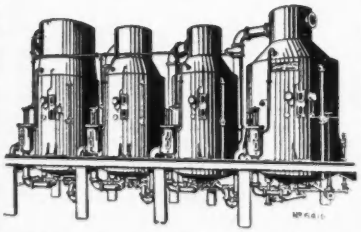

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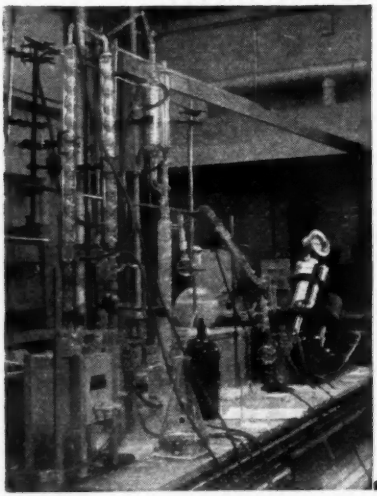

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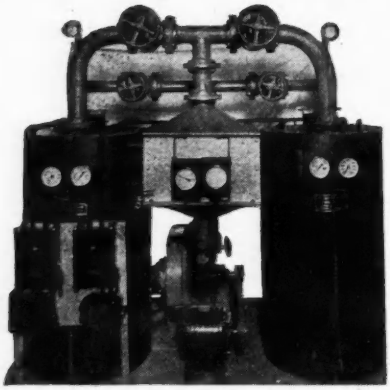

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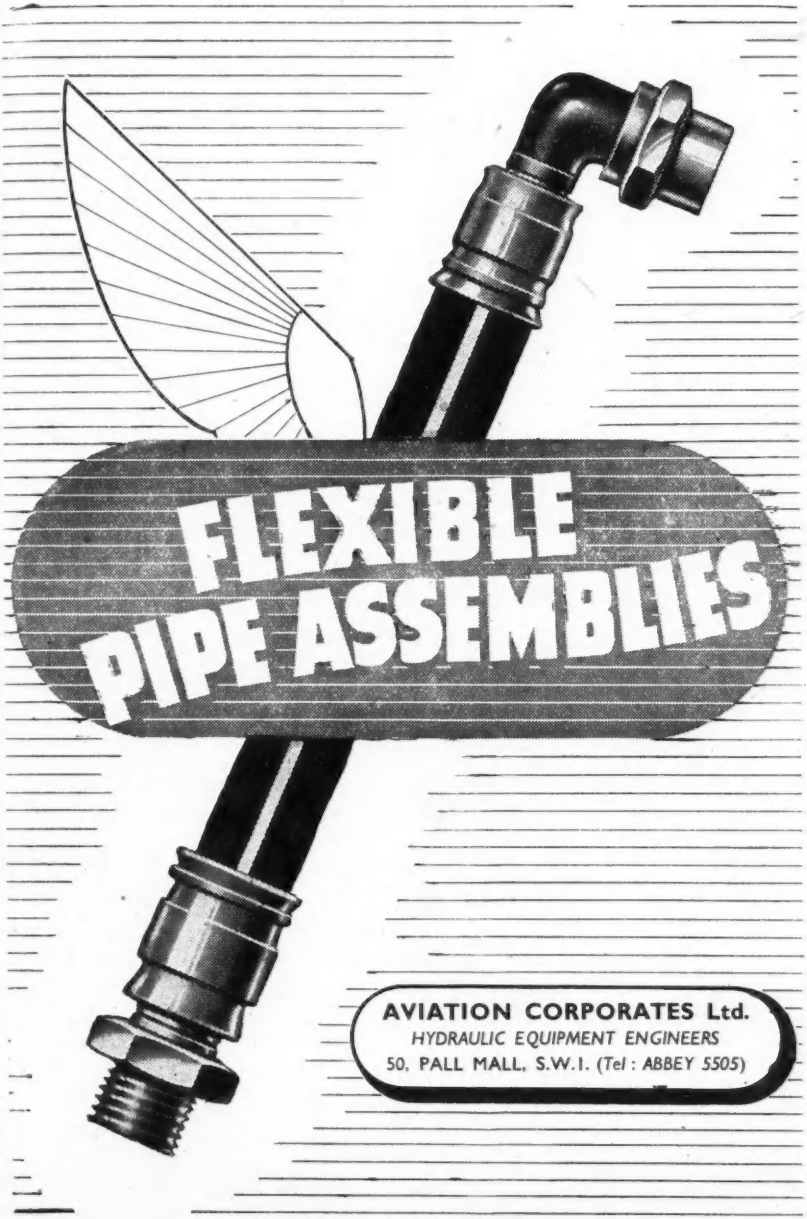

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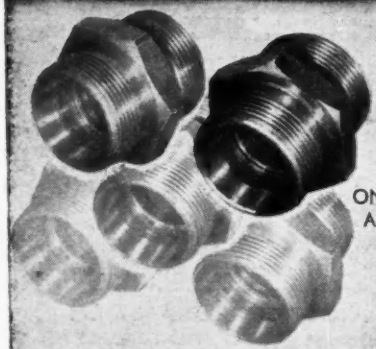

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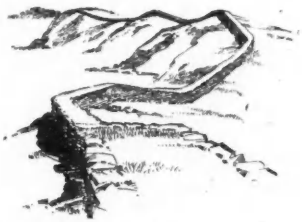

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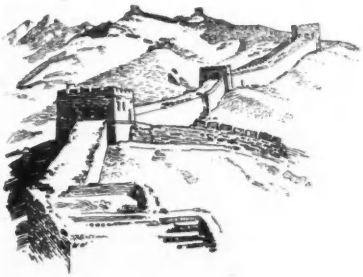

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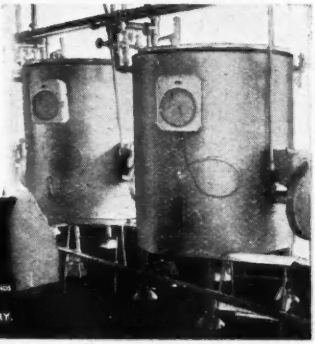

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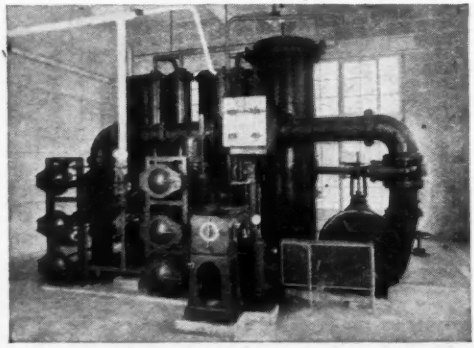

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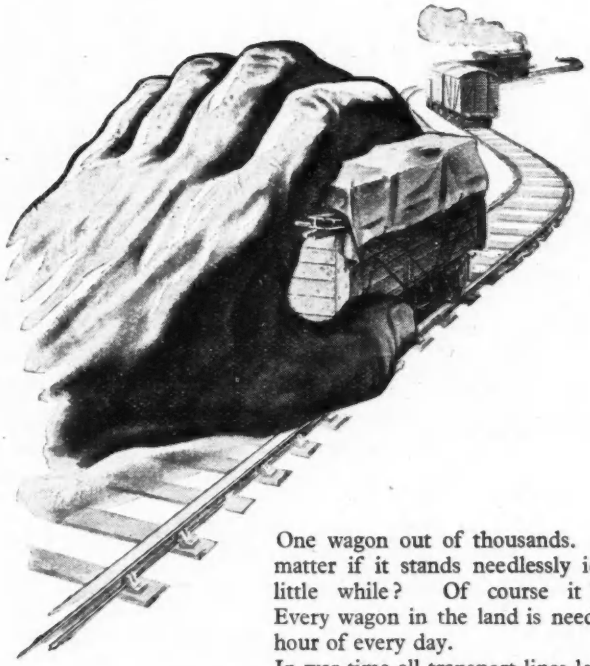

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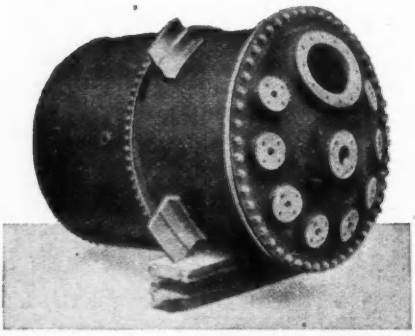

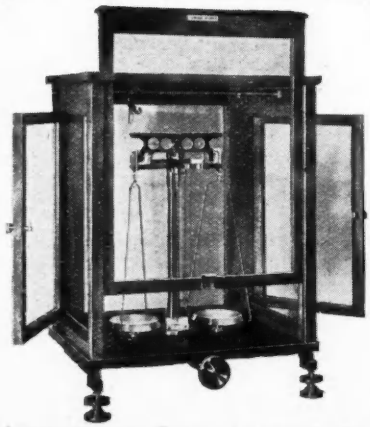

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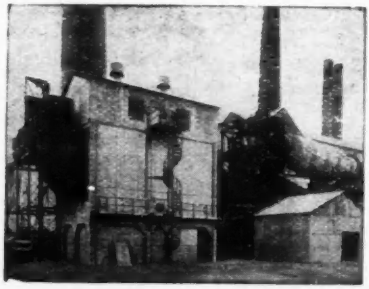

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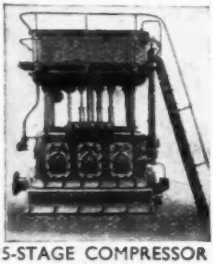

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February 12, 1944

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Enterprise and Reconstruction

IN our leading article last week we discussed whether competition was necessary as a principle of business and more particularly, whether it was an essential condition of progress, having in mind the possibility that technical and scientific men will make advances in the arts and sciences because of their inherent interest in their subject and not from desire for financial reward. Our conclusion was broadly that, while such people do exist and while competition in the future will be very different from 19th-century competition, it remains essential, for the application of discovery to industry, that there should be some spur.

There has lately been published a book entitled "Sheffield Burns" by the late Dr. W. H. Hatfield, F.R.S., who was known to many of our readers for his outstanding work in the steel industry. Watching Sheffield burn in December, 1940, during the German attack on the city, Hatfield felt himself impelled to make a contribution towards its reconstruction. He had travelled much, he had spent 60 years in contact with his fellow men — 35 of them in the steel industry of Sheffield. He has noted that every nation is made up of individuals governed by human nature and that, though Empires and Kingdoms may rise and fall, there is yet sound evidence that human nature has not fundamentally altered within historical times. Thus mankind in general is made up of individuals who are dynamic in the sense that they like change and are ever desirous of improving their condition. "Divine discontent is the essential mainspring of human action which is responsible for the development of civilisations. . . . It is the result of 'pressure in the boilers' of the races and the variable pressure in the boilers arises from the varying aspirations and vitality of the different races." Reconstruction must therefore be based upon the principle that "mankind will continue to receive better conditions, and will no doubt make collective endeavours to achieve what it sets its mind on. . . . It is inconceivable that great numbers of people will be content at any time with the conditions in which they find themselves. Either their wants, their desires or their tastes will not be satisfied." Upon this restless mass of humanity our reformers are endeavouring to impose reconstruction in one form or another. This reconstruction, as Hatfield noted, is based on a new principle: that of creat-

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ing, not only a nation, but a world in which every human being can attain happiness and economic sufficiency.

It is not necessary for us here to follow Hatfield's vision of a new Sheffield. It is in many respects little different from the vision of many other town-planners, though he notes that education to make people value their improved amenities is essential. Our experience of industrial cities leads us to suggest that if education does not precede reconstruction, the people will be prone to reconstruct their new cities into slums. Hatfield also noted that a physical reconstruction, such as he proposes, would cost a great many millions of pounds, but he believed that if every man, woman, and child in Sheffield would pay 1s. a week for 20 years in the form of reconstruction bonds, adequate finance would be available and the people themselves would have reconstructed their city.

All this is fairly commonplace and would not necessarily interest industry, except in so far as it provides work and affects the cost of production through rates, etc. A highly important feature of Hatfield's conclusions, however, is that the first step in reconstruction must be the re-creation of wealth. He rightly points out that this may be regarded as reactionary, but defines wealth as consisting of things that satisfy one directly or indirectly or, in Dr. Johnson's definition, "prosperity, external happiness." The only way to create wealth is through industry, and the author can see no prospect that the ancient economic law that they who produce shall also consume, must remain valid. How is industry to be maintained in a prosperous condition? Hatfield had little doubt on this subject, and it is worth while quoting a passage from his book in illustration: "After the war, our country will have its work cut out if it is to maintain that position in commerce to which it may rightly aspire. It is only by the most able use of our resources, personal and material, that this can be done. Intimate collaboration between capital, enterprise, and labour is imperative. We hear much in these days of capital and labour, but I think we should hear a little more concerning enterprise. It is enterprise in its broadest sense, in one form or another, which, through the ages, has converted our ancestral tribes of Neolithic times into the orderly, intelligent, industrious communities of to-day."

Mention of enterprise brings up the problem of competition, and this introduces tariffs, trade associations, and a whole host of other subjects, upon some of which the author is silent. It must be remembered that he himself was an exponent of collaboration. He served on many of the committees of the iron and steel industry in which technical men of competing firms pooled their ideas for the betterment of their industry. In regard to tariffs Hatfield remarks: "We have excellent workmen, excellent direction and management, and we apply science to our industries to a degree not exceeded in any of the industrial countries. Why then did we need safeguarding? The answer is that Britain is an excellent and rich market, and now we have protection will in itself provide demands for our productions sufficient to ensure our charges being reasonably carried; overseas trade will have to do the rest. Sufficient business is the essential in modern works where plant and upkeep are necessarily so costly." The whole of the employees of a firm or company must realise that their continued employment rests in large measure on their own efforts. It is thus clear that enterprise, coupled with a reasonable protection of the home market, is considered to be the basis of our future business organisation and that competition is necessary, but should not be carried to the extent to which it has been in the past.

There is a great deal of sound sense in Hatfield's book, and it is one which we would commend to those who are interested in the future organisation of industry generally. Dr. Hatfield died in October last, four days after the proofs had been handed to his printer. The book is in a sense the memorial of one whose name has long been a household word in the steel industry.

A new quarterly, published by the British Medical Association and entitled the *British Journal of Industrial Medicine*, made its first appearance at the end of January. It aims at providing scientific material of value to doctors working for industrial staffs, and it will be of great interest also to employers of labour. The editor is Dr. Donald Hunter, head of the Department of Industrial Medicine at London Hospital.

NOTES AND COMMENTS

Reinstatement

A CONTROVERSIAL point that has arisen from the operation of the Essential Work Order is the legal interpretation of the word "reinstatement." Many employers, directed to reinstate men they had dismissed, took the line of putting the workers back on the pay-roll, but did nothing about putting them back to work. Many employees were well satisfied with such action, being quite happy about the opportunity of enjoying an extra holiday with pay. From the national point of view, this procedure made nonsense of the Essential Work Order. It seemed for a while that word "reinstatement" had acquired an entirely different meaning from that attributed to it by the dictionary. Now three judges of the High Court have ruled that reinstatement entails giving work to the reinstated employee. The law and the English language are once more in step, and the ridiculous anomaly which has militated against the national interest for too long has at last been killed.

Against Evening Classes

IN the course of answering a series of questions put by Sir Granville Gibson in the House of Commons last week, regarding the proposed Young People's Colleges, the President of the Board of Education announced that it was one of the Government's objects to avoid evening work for young persons. So far as we know, this is the first official avowal of a principle that we have long been fighting for. In practice, as Mr. Butler pointed out, many firms have been working on the day-time education system for young employees for some years; Captain Cobb, indeed, interposed the remark that employers in Rugby regard the scheme as of immense benefit. But we think that Sir Granville voiced the wish of those who are still in the majority when he asked the Minister to make it compulsory to attend the proposed colleges in the evening. "If 500,000 young people go to these colleges for three years each," he said, "it will mean a burden on industry of £30,000,000 a year," assuming an attendance of one day a week. Mr. Butler offered to discuss costs with him at some later date; and we think that those who hold Sir Granville's view will find that in the long run the expenditure will be repaid, and repaid with interest. Capital expenditure on improvement of plant is not normally regarded as wasteful; it requires no great stretch of imagination to apply the analogy to improvement of man-power.

Patulin

LAST November patulin came into the news as a prospective cure for the common cold. Its efficiency for that purpose is now being thoroughly investigated at large establishments all over Britain, and we await with impatience the results of these trials. In the meantime some new details about patulin have been published by Professor Harold Raistrick, Mr. George Smith, and Mr. W. K. Anslow in the *Journal of the Society of Chemical Industry*. Patulin, it appears, is not only a powerful actibacterial agent, completely inhibiting the growth of certain bacteria at concentrations of 1:50,000 – 1:100,000, but has a similar effect upon fungi. Isolated originally from the mould *Penicillium patulum*, patulin is able to suppress completely the growth of a number of species of another kind of mould, known as *Pythium*, that parasitises seedlings and causes the disease called "damping off." This remarkable anti-fungal property is shown at a concentration of 1:400,000 – 1:500,000, and partial suppression of the parasite is obtained even when the concentration of the patulin is only one in a million.

Four Possible Sources

THE paper announces that *Penicillium expansum*, the blue-green mould that causes apples and pears to rot, also produces patulin. Dr. Bergel and others recently suggested that several other moulds yield the same metabolic product, and that claviformin and clavatin are identical with patulin. It now seems certain, as Professor H. W. Florey wrote recently in *Nature*, that claviformin—which is patulin—is produced by at least four species of fungi.

Some sort of order is now emerging from the field of mould-derived bacteriostatics. With the realisation that there are four potential sources of patulin it should not take long to find which of those sources is the richest. We may expect a process capable of yielding large quantities of patulin from mould-cultures to be perfected in the not-distant future, and in view of the relative simplicity of its chemical constitution a synthesis of the compound will probably not be long delayed.

The B.B.C. Reforms

IN the last few months the B.B.C. has been given sufficient evidence to convince it that the scientific world was dissatisfied with the way science is generally presented to the radio public. The B.B.C. was criticised on this score by THE CHEMICAL AGE and other journals, and towards the end of 1943 the British Association sent a deputation to Broadcasting House to ask for *more* science programmes and *better* science programmes. The fact that last Sunday's "Postscript" was given by a distinguished scientist seems to us a proof that the B.B.C. has come to realise the justice of those criticisms.

A Scientist's Postscript

SIR LAWRENCE BRAGG did well to devote his talk, not to the description of the new "toys" made possible by small technological advances, but to a consideration of the new type of civilisation that is arising through the application of the scientific method. His argument to counter the widespread idea that the rapid advance of science is a disaster, because our own powers of physical achievement have outstripped our morality, was so well expressed that we quote it verbatim: "This is, I think, a craven point of view," he said. "The greater our powers, the more complex the society in which we live, the greater is the opportunity for higher endeavour. The effect of the new technical achievements, easy communication, rapid travel, plentiful power, command over materials, is to give the world a higher type of nervous system, knitting it into a more closely linked and interdependent whole. As this more closely linked world is a more sensitive organism, and therefore possibly more politically unstable, the new scientific achievement must be matched by a growth in political sanity. Just as the change from hunting to agriculture made a much higher type of civilisation possible, so surely the new and still greater command over nature which man is beginning to achieve will, in its turn, be the basis for a higher civilisation still. The new powers can be used for good and bad ends, but that is all part of the adventure." We congratulate the B.B.C. for sponsoring this broadcast, and we hope that it is a token of change in the B.B.C.'s attitude towards science.

Ministry of Science

A BOUQUET—not a very large one, it is true, but still a bouquet—was thrown at the Government by Lord Samuel in the course of his speech from the Chair at the annual luncheon of the Parliamentary and Scientific Committee last week. He spoke with approval of the appointment to the Government of four men with scientific training—Sir John Anderson, Sir Stafford Cripps, Lord Woolton, and Lord Cherwell—in consequence of which the Government had, on the whole, become well informed and keen in matters of science. He wished, however, that they would go further than that, and suggested that the Lord President of the Council should be made responsible for scientific matters in the Cabinet, aided by an intelligence staff to watch developments abroad. It should be the Lord President's business, he thought, to act in the interests of scientists of all grades. In view of the demand that has been made from time to time for "scientists in the Government," and of the growing public interest in the application of scientific discovery to daily life (which Lord Woolton mentioned in a later speech), Lord Samuel's proposal represents an interesting compromise, and one that would appear to be workable. As we see it, the thin end of the wedge was applied when Lord Cherwell was appointed to the War Cabinet; when Lord Woolton was called to the Ministry of Food the said wedge was driven further in; and there now appears no reason why other non-political appointments should not be made in the fullness of time, to open the road for the entry of science, and of consideration for the rights of scientists, into the innermost councils of the State.

FUEL ECONOMY IN THE CHEMICAL INDUSTRY

Fuel Efficiency Lectures

V.—The Metering of Process Steam

by H. E. DALL

METERING must always form the basis of the most economical generation, distribution, and utilisation of steam. A 2 in. pipeline carrying steam at common velocities is conveying as much fuel energy as is represented by a cable carrying 200 kW. It would usually be unthinkable to instal a motor or other piece of equipment needing 200 kW. without a suitable meter in circuit. Steam meters are much less frequently used than electricity meters, probably because the electricity was developed more recently when those responsible realised the need for metering heat and power. Although steam is a more tangible fluid, the problem of its measurement is not so simple as that of electricity, and both the cost and accuracy of steam meters are liable to be less favourable by comparison with electricity meters. Nevertheless, the installation of steam meters has proved to be warranted by the information obtained and the economies resulting.

The common incentives for metering are threefold. Firstly, the sale of the product metered, or allocation of costs against the quantity used; secondly, the checking of wastage or the consumption of a machine against guarantee; and thirdly, the operation of a process in the most efficient and economical manner, for which the unaided human senses are not adequate. Perhaps allocation of costs is the most compelling incentive, and it certainly most often results in surprising economies, enabling the cost of the meter to be covered in a matter of weeks. As an example of this, the case of a very large soap works may be cited. The departmental demand for steam was steadily increasing and eventually outstripped the capacity of the range of 30 Lancashire boilers. Before ordering new boilers it was decided to instal complete departmental metering. When this was done it was quickly found that the steam demand moderated, and after a short while a number of the existing 30 boilers were found to be superfluous. This reduction was not accompanied by any reduction of quantity or quality in the product. The capitalised value of the resulting economies is often vastly greater than the cost of meters. In the 2 in. pipeline cited, an economy of 10 per cent. would represent a capital value of about £500 reckoned on a 15 per cent. basis for a 120-hour week schedule.

Three Methods of Metering

The principal methods now in regular use for the metering of process steam in pipelines, may be classified into three groups: (i) The differential pressure method generally employing an orifice in the pipeline and coupled to an indicator or recorder which may be some distance away. (ii) The rotary meter in which an impeller or fan is driven by the steam and the steam quantity is read on the meter counter at the point of measurement. (iii) The critical velocity method in which a single pressure gauge or recorder is calibrated in terms of steam flow and is coupled with a single pressure pipe to a shaped nozzle in the pipeline. All three methods involve the principle of obstruction. The steam is accelerated to a velocity at least double that of the pipeline, and in passing the obstruction the resulting pressure-change is made to operate the indicating or recording element. Except for critical velocity measurement the pressure drop involved is small by comparison with the total pressure in the pipeline, normally 1 or 2 per cent., and as it is a case of simple throttling, there is no loss in total heat content of the steam.

The Differential Pressure Method

It is probable that the first method of measurement is the one most commonly in use at present. The differential pressure-producing element is, as mentioned before, usually an orifice, although sometimes a shaped nozzle or even a Venturi tube has been used. Since there is no loss in total heat due to this throttling, there is no virtue in the use of the Venturi tube for process steam, the only merit of which is to regain most of the pressure lost on the acceleration. Pressure connections are made on each side of the orifice or nozzle, and it is essential at this point to interpose cooling or condensation chambers so that the pressure pipes to the recorder shell remain full of water. These cooling chambers also provide a reservoir of water sufficient to cope with the displacement of the meter due to variations in the rate of flow. The recorder (or electrical transmitter) is usually connected to the cooling chambers with copper pipes and the only precaution necessary in laying these is to avoid upward bends or traps in the pipe where air may accumulate and be difficult to dislodge.

The recording or indicating element most usually employed is at present of the mercurial type consisting substantially of a mercury "U" tube subjected to the pressure difference across the orifice. A cast-iron float on one limb of the "U" tube communicates the rise or fall of the mercury level through a gland to the pointer or pen of the recorder. Overload valves are fitted to prevent mercury from being blown out on excess or reverse loads. Mechanical or electrical integrators are used when a totalised counter record is required of the weight of steam passed. All meters of this class have a flow range which

is limited by the square law relationship between steam flow and differential pressure. Thus the change of mercury levels is reduced to only 1 per cent. of the maximum when the rate of flow has fallen to one-tenth of the maximum rating. Under these circumstances it is easily seen that a range greater than 10—1 in flow cannot be expected from a meter of this class. Should a longer range be required, say for instance to cater for summer and winter flows for steam heating, it is desirable to change the orifice plate at the appropriate time. The square law relationship, while restricting the measurable flow range with any one orifice, has definite advantages in that a more open spacing is given over a limited flow range, particularly at flows exceeding two-thirds of the maximum. The square law relationship is the same as that of a hot wire ammeter, and the difficulty of giving a longer range is exactly comparable with this electrical instrument. Another disadvantage inherent in the orifice law is the influence of steam density on the readings. The difference of pressure is affected not only by the flow variations but also by variations of steam density, and as a result the steam meter readings are strictly correct at only one value of the pressure and temperature. This is not, however, such a serious disadvantage as might be supposed because the variation in flow reading with pressure changes is not large, and provided that the mean pressure and temperature are chosen with reasonable care, any corrections due to variations from the mean figure will balance out over a period of a day or so. Certain meters are mechanically or electrically corrected for variations in steam pressure, but the added application and expense of this automatic correction is justified only for exceptional conditions.

The Rotary Meter

The second method also employs the orifice principle and is subject to the same laws. The pressure difference due to flow is, however, utilised to set up a smaller flow proportional to the main flow in an auxiliary circuit on the well-known "shunt" principle. The auxiliary circuit includes nozzles which impact the flow on the blades of the rotor, causing it to rotate at a speed proportional to the main steam flow. A particular feature of the meter is that the rotor speed is kept quite low by damping blades which rotate in the water of condensation in the lower part of the meter body. The motion of the rotor is reduced by suitable gearing via a magnetic gland to the external counter. This kind of meter is ideal for departmental costing, and where indication or diagram is not required, and no particular attention is required to be given to the meters other than a weekly reading of the counters. The characteristics of the meter are also of a type which enables it to deal accurately with rapid variations of flow or even slow pulsations. The first method already described cannot be used on pulsating flows owing to the root-mean square error given by the law (due to the square law already referred to). Pulsations, however, are not frequently experienced in steam pipelines for process needs except where pass-out steam from engines is used. The rotary shunt meter is very flexible in its overload capacity. Loads up to 100 per cent. above the nominal maximum are accurately measured, though the excessive use of this overload capacity would reduce the effective life of the meter.

The Critical Velocity Method

The application of the third method of measurement (the critical velocity method) is somewhat more limited than the other two, but it is nevertheless an extremely valuable method which would be more widely employed if its extreme simplicity were more commonly appreciated. It can only be used where a comparatively large pressure drop is permissible. Examples of this occur frequently in process steam lines, *i.e.* steam used for heating vats or vacuum pans or for the generation of water gas by the intermittent steaming of hot fuel beds. A shaped nozzle is always employed in this method of measurement, and a single pressure tapping only is required into the pipeline on the inlet side of the nozzle. If steam is discharged through the nozzle so that the absolute pressure on the outlet side is less than half that on the inlet side, the flow through the nozzle is "critical," *i.e.*, it is equal to that of sound at the conditions existing at the nozzle throat.

The characteristic of "critical" flow which makes it so useful for metering purposes is that the rate of flow is proportional to the absolute pressure on the inlet side of the nozzle and is quite unaffected by the pressure on the outlet (provided the flow remains critical). Consequently, it is only necessary to calibrate a standard pressure gauge to read in terms of rate of flow direct. This reading is moreover pressure-corrected, in the sense that variations of upstream or downstream pressure are completely allowed for in the scale calibration, and the only remaining correction is a relatively unimportant one for variations of temperature. Moreover, pulsations or rapid fluctuations in the flow have no effect on the accuracy, it being merely necessary to damp the pressure gauge in the usual manner to avoid excessive oscillations of the pointer. Pressure recorders can, of course, be used with equal facility, and compared with differential pressure recorders are comparativley inexpensive.

As an example of the use of these critical flow nozzles, supposing the boiler supply is at 100 lb./sq. in. gauge (say 115 lb./sq. in. absolute) and the steam is being discharged to process at practically atmospheric pressure, a flow range down to one-quarter of the maximum rating will be given before the flow ceases to be critical. This flow range will be found to meet most process steam needs, but if a much greater flow range is necessary then one of the other two methods must be employed. The flow to the nozzle must be controlled with a valve on the

upstream side of the nozzle, no throttling being permissible on the nozzle outlet, otherwise the pressure may be built up on this side and prevent the attainment of critical discharge.

Checking the accuracy of any type of steam meter is not necessarily a difficult operation, although with the larger flows it may involve expensive and unwieldy equipment. For flows up to a few thousand lb. per hour it is possible to arrange for condensation tests without much difficulty, the usual method being to weigh the increment of condensate. Corrections should be made for pressure and temperature, or wetness in the case of wet steam. Unfortunately, the measurement of wetness is technically more difficult than that of pressure and temperature and the results obtained by throttling calorimeters are not always reliable. The law of an orifice or nozzle is, however, so well established that users of steam meters have been known to obtain their wetness fraction by comparison of the steam meter reading with weighed condensate tests.

Discussion

Q. Can further information be given concerning the action of the magnetic gland at the bottom of the second type of instrument illustrated?

A. The method of the magnetic gland is quite generally used when it is not necessary to transmit much power, for instance where it is necessary only to rotate a pointer. For this purpose a permanent magnet is rotated by the movement under pressure and the magnetic force is transmitted through a casting to a corresponding magnet on the outside, so eliminating the need for a packed gland.

Q. How is it possible to calculate the amount of steam which is actually required for a process?

A. In some processes by a calculated heat balance. In others it is possible for the plant engineer to run the process under observation, working as efficiently as possible in order to determine a target figure for, say, a week's run. Comparing this with the meter reading obtained without supervision, it will usually be found that far more steam has been used than was necessary generally through valves being left on unnecessarily, through traps being discharged to waste, also through such purposes as boiling kettles, etc. The operators should be encouraged to work to or beat the target.

Q. What is the disadvantage of using a Pitot tube for steam measurement?

A. There are two main disadvantages. First, the velocity is measured in only one filament of the stream, but the velocity distribution across the pipe area is not uniform and varies from pipe to pipe. If the Pitot tube was inserted in the middle of the pipe there would be a multiplication factor of, say, 0.8 for one pipe and 1.1 for another. Variations of at least this order are given by disturbances such as near-by bends or elbows. Second, the Pitot head is not under control and if the pipe velocity is low, say 20 to 30 ft. per second, no commercial meter or manometer is capable of giving a practical reading at such a low head (under 1 in. w.g.). It is far better on both counts to accelerate the whole of the flow through an orifice.

Q. Would not traverse tests with the Pitot meter give the sum of the velocities?

A. It is possible by making traverses on two axes to get a reasonably accurate distribution figure, but the difficulties involved are generally much greater than the alternative of shutting down and slipping in an orifice.

Q. With many complicated steam systems it is sometimes impracticable to obtain as many meters as are desirable. A method which seems to be successful on long lines is the use of two pressure recorders or pressure gauges to take the pressure loss through the line. The steam flow calculated upon pressure loss after making allowance for the temperature nearly always works out at approximately 0.8 of the meter measurement. This is a very simple way of regulating steam flows through long lines. Has the lecturer any comment to make upon this?

A. This can be done sometimes, but in average industrial lines, which may be under 100 ft. long, the pressure drop would be hardly sufficient to operate the gauges. If the pipelines were 1000 ft. long, rather exceptional for steam work, pressure gauges might operate successfully, particularly where the pressure drop was say, 10 per cent. of the initial pressure. On a short pipe run, giving only 1 or 2 lb. drop, sufficient reliance could not be placed upon the difference between the readings of the two gauges. Another objection to the method from a practical point of view is the probable variation of the condition of the pipe and the amount of condensate present. Moreover the pressure loss varies with the bore of the pipe to the fifth power law and an error of 20 per cent. might easily occur. Subsequent calibration against a meter could correct such errors. It should be borne in mind that the law of friction in pipelines is not a true square law. The average was more like the 1.8 law, so the result would not be particularly accurate, yet in certain cases it might be useful.

Protection Against Cold

Q. The orifice meter is very useful for measurement of enclosed steam in all-weather conditions, but much difficulty has been experienced in very cold weather owing to the meter splitting. Anti-freezing mixtures have been used in the meter and the magnetic glands, but not with much success. Has the lecturer any suggestions to make for the protection of meters in cold weather?

A. The ideal protection is to instal the meter indoors under cover. If it is placed outside, precautions must undoubtedly be taken to guard against freezing. Probably no steam meter will remain undamaged by frost. The recorder should always be kept under cover. On the other hand, rotary steam meters are used out of doors even in the most severe weather.

There is no danger of freezing if the steam is on the line, but if the steam is shut down the water should be drained from the meter.

Q. Would the lecturer agree with using asbestos-covered cable through which an electric current thermostatically controlled is passed, to prevent freezing ?

A. Yes, but the man in charge must remember to switch the current on to the cable.

Q. It has been mentioned that the orifice type is not very good for reciprocating flow. Is a receiver sufficient for damping when using a meter of the orifice type ?

A. Yes, it is necessary to damp the flow of an orifice meter so that the troughs of the flow wave form were not less than about one-half the peaks. The meters would deal accurately with a flow of this type and the R.M.S. error will not exceed about 1 per cent. With a receiver of adequate capacity fitted, the outlet flow would be merely rippling. The rotary steam meter can be used accurately on slow pulsations, even going down to zero velocity provided that the speed does not exceed about 30 per second.

Q. Can the critical velocity meter be used with gases ?

A. Yes, but not for liquids. There is no critical speed for a liquid.

Q. There do not seem to be any valves on the cooling chambers. If air is trapped what would be the effect on the cooling chamber ?

A. There is no effect on the meter, provided that the level of the water is above the connection nipple which is half-way down the chamber.

Q. If 15,000 lb. per hour of steam is passing through a 4 in. pipe at 120 lb. pressure with a high velocity, and an orifice plate is inserted, what will be the resulting pressure loss ? Are any restrictions put forward with a Pitot meter ?

A. A 4 in. line could be metered accurately with orifice plates if the velocity does not exceed approximately 250 ft. per second. If the velocity is higher, it is advisable to insert a short length of larger diameter (say 6 in.) about 12 ft. long. For process steam even 200 ft. per second velocity is excessive in pipelines. With a Pitot tube the restriction would be less than with an orifice.

No Heat Loss with Throttling

Q. The statement has been made that throttling the system does not result in any loss of heat. Can this statement be substantiated ? How can steam be throttled without doing work in some form or other ? For example, there can be a drop of 5 or 6 lb. in a steam motion by friction. Can it be claimed there is the same total heat at one end of the system as at the other ?

A. Yes, if the steam velocity has returned to its original, the total heat will be the same. After accelerating through the orifice the steam regains its initial velocity after some little distance and the whole of the heat used for the acceleration is regained on deceleration. With steam this results in a slight superheat. Supposing the steam was 100 lb. pressure on the upstream side of an orifice and 95 lb on the downstream, some distance downstream the additional superheat would be perhaps a degree.

Q. But one cannot have a drop of 5 lb. in friction and still have the same energy ?

A. The total heat would be the same. The energy of the eddies is always dissipated as heat which returns the total heat to its initial value at equal velocity.

Q. It would appear that for small process work and space-heating requirements with a pressure of about 70 to 100 lb. it would be better to adopt a rotary meter. Is this correct ?

A. Frequently, yes. The rotary meter is often extremely useful and can be applied in many cases where differential meters are at present used. To observe variations of flow rate the differential type must be used.

Q. It would appear to be less worry to the engineer to use the rotary type ?

A. Yes.

Metering Reduces Fuel Bills

Q. This remark is not so much in the nature of a question as of an observation. It would appear from what has been said earlier that in a plant of 30 boilers on a soap works the reduction in the use of energy due to metering was so great that some of the boilers could be put off. If such a step could be proved possible then it would be a strong argument in favour of the policy of fuel economy. In other words, a target could be set.

A. Metering reduces fuel bills every time. A common example is the metering of water in houses. The average consumption in a single household is estimated to be 35 gallons per head per day. Abroad the figure is substantially the same where no meters were used. When meters are used the figure drops to 10 to 15 gallons per day, because water is not wasted. A similar fall in consumption can be shown with steam.

Q. It has been stated that when these meters are installed the gain has not been worth the expense, from the point of view of maintenance. Is that so ?

A. No. The cost of maintenance is very small. The chief engineer should seek the willing co-operation of his colleagues and workpeople. Meters must receive some attention or the result will be poor. The chart recorders must be changed daily. When the counter readings were taken once a week the pen is filled with ink. Mechanical breakages were relatively unknown, although clocks are known to stop occasionally, requiring a six-monthly or annual inspection.

Q. Is there any case known of a works engineer being forced by his directors to put in meters ?

A. I am not aware of one. The poor engineer usually has to go cap in hand and beg for one.

Q. When measuring steam to water-gas plants with constant-cycle on-and-off load, the steam meter may be of very little use for measurement purposes, but it acts usefully as a

cycle recorder, enabling a check to be kept on the man operating the plant which was not possible by any other means. Steam meters can often be used most successfully as cycle recorders with great benefit to the management.

A. Agreed.

Q. Is there an instrument which will record reverse flow of a small order which would not ordinarily be measured ?

A. With differential meters it is difficult to arrange for the measurement of reverse flow unless it is known when the flow was reversing and change-over cocks are operated. A rotary meter is made which can be used for reversible flows both in the single form giving the net forward flow, or the double form giving both forward and reverse flows separately. These need no attention at the flow reversals.

Q. Since modern elementary school education does not teach youngsters to read meters with pointers, will not manufacturers cease making this type ? It would be much better to use numbers, especially where a works uses 40 or 50 meters. The discrepancies in reading meters with pointers are often colossal.

A. The author agreed and said there was a tendency some years ago to go over to direct reading, but now he noted a tendency to revert to pointer types which were simpler mechanically and gave no doubts about the reading at the change-over point.

Q. Is there not a very elaborate British standard specification on metering from which works can make their own meters ?

A. B.S. No. 1042 is a very useful survey of the methods in use in industry. All the methods described are subject to tolerances which are set out in the specification. This specification substantially represents 90 per cent. of industrial experience to-day and the figures obtained are reliable to the degree of accuracy mentioned in the tolerances. Anybody can manufacture his own orifices provided he works to the specification and takes the precautions set out in it.

[The Chairman said the experience at the Ministry of Fuel had been that if they supplied people with elaborate sketches how to make a steam meter, they preferred that some outside firm should supply a finished article. There are inexpensive steam meters available and he recommended those interested to get into touch with the secretary of the Technical Sub-Committee of the Ministry, 2, Little Smith Street, S.W.1.].

Q. Are square-edged orifices used for critical flows ?

A. No, they are not satisfactory at critical flows because the discharge coefficient is not constant but varies with the pressure ratio.

Q. Dyehouses may use 80,000 lb. of steam per hour during the day shift but only 2000 to 3000 lb. per hour during the night shift. In trying to educate fuel officers in fuel economy it was found that if, during the night, they shut off a radiator or two the meters showed a lower consumption, but although it was claimed that a lot of steam had been saved that was not, in fact, saved. Is it possible to put in a smaller meter to take care of this ?

A. Yes, by a smaller by-pass meter, if the engineer is prepared to operate the valves at the end of the day shift. It is also possible by using a variable orifice in the same line, likewise manually operated.

Q. How can steam at very low pressures be measured ?

A. There is no difficulty in measuring steam at low pressures down to a few lb./sq. in. abs., the only precautions being that the maximum differential is kept correspondingly low, and the meter glands effective against air ingress.

Q. What are the possibilities of applying automatic control to a series of vats which have to be kept at the boil after being brought to that condition rapidly ? Is the critica flow meter mentioned by the author applicable ?

A. The problem is rather difficult, owing to the cessation of temperature change at boiling. A critical flow meter is not suited to a very long flow range such as would be necessary for the condition mentioned.

Q. What are the best positions for the tappings in the orifice type of meter ?

A. In theory it does not matter a great deal where the tappings are placed, provided that there are coefficient data for the taps used. There are some advantages in corner tappings inasmuch as the discharge coefficient is more constant and is less sensitive to variations in pipe size.

Summary

The chairman, summarising the discussion, said that the metering of steam, and of fuels generally, was most important in any works fuel economy campaign. It has been found to be the precursor of very considerable fuel economies for often the waste that was taking place was not realised until measurements were made. This subject is intimately bound up with the problem of smoothing out peak loads, a subject that is to be discussed at the next meeting. Even if the metering was not completely accurate, it would serve as a check upon the rise and fall in consumption, but, of course, the more accurate, the better. The amount of steam recorded as being used in any process plant should be compared with a calculated estimate of the amount theoretically necessary, and any considerable deviation should be accounted for.

The British Government has officially announced its intention of reducing its purchases of Northern Rhodesian copper by 20-25 per cent. of the aggregate annual rate of production achieved in 1943 by the four mines—Nkana, Roan Antelope, Mufulira, and Nchanga. The cut will be borne in roughly equal proportions by the first three named, and the increase contemplated in the purchases from Nchanga will be abandoned.

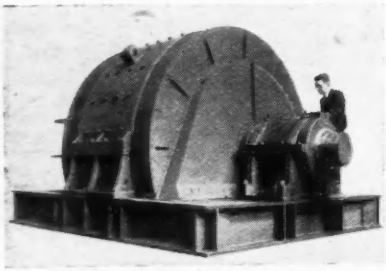
B.T.H. Progress in 1943

New Rolling Mill Equipment

FOR security reasons nothing can be said about many of the important developments made by British Thomson-Houston Co., Ltd., during the past year, but the following brief notes about equipment of interest to the metallurgical and chemical industries will indicate that the company is keeping abreast of the times with what may be termed its standard products.

Among orders received for rolling mill equipment are those for two direct-coupled drives for light-alloy reversing mills, each capable of working peaks of 6000 h.p. Each mill will operate in tandem with a hot breaking-down mill, the drive for which is also being built by the B.T.H. Co., and in addition to the usual B.T.H. arrangement by which the table rolls will be synchronised with the mill rolls in order to avoid scratching the material, special arrangements to the same end will be made for transferring the material from one mill to the other.

All table roll and screwdown driving motors and controls are included in the contract. In each case the mill motor will be supplied under Ward Leonard control from a motor generator set driven by a synchronous motor. A novel feature of the equipment is that the power factor, or alternatively, the reactive kVA input, will be automatically maintained at a pre-set value over a wide range of loads by means of special amplidyne control. This provision is expected to give easier conditions for the supply system than would obtain with an unregulated synchronous motor, where wide fluctuations of load such as occur in a reversing rolling-mill drive are accompanied by correspondingly wide fluctuations of power factor.



Reversing motor for light-alloy hot-breaking-down mill.

Another hot-mill drive of considerable interest is that for a tube reducing mill. The mill consists of twenty closely-spaced stands, each of which is driven by a 40-h.p., 800/1600 r.p.m. motor, all the motors being supplied under Ward Leonard control from a common motor generator set. The whole equipment is controlled from a conveniently arranged desk. In a mill of this type, special attention must be given to the fine speed control of the motors, and to their transient and steady speed regulation, if trouble with stretching or "ballooning" between stands is to be avoided.

Cold tandem mills are represented by a small mill for rolling a special product driven by seven motors ranging from 25 to 60 h.p., supplied from a Ward Leonard motor generator set and provided with full push-button control.

Non-Ferrous Mills

Among non-ferrous mills may be mentioned the drive for a reversing cold strip mill, consisting of a slip-ring induction motor capable of peaks up to 400 h.p., operating under full contactor and push-button control.

Two synchronous induction motors, of the B.T.H. well-known AMT type, are being built for the direct drive of main rolls. These are both rated 500 h.p., and will be used for driving cold breaking-down mills.

The developments which have taken place during recent years in the continuous rolling of steel strip have been accompanied by the parallel development of continuous strip processing lines of various kinds. A typical example is afforded by a group of four cleaning lines, in which electric and electro-pneumatic drives applies to such units as scale breakers, stitchers, pinch rolls, oilers, shears and recoilers, account for seventeen motors ranging from 3 to 20 h.p., supplied from two motor generator sets. The four lines will be under complete control from two specially designed desks, one at the entry end and one at the delivery end, and suitable signalling arrangements between the two desks will be provided. An interesting feature is the use of photo-electric relays to stop the ingoing pinch rolls automatically when the end of the uncoiling strip is reached.

During the year a 250 h.p. motor drive has been put into operation for a Pilger-type tube mill and a 500-h.p. induction motor drive for a cold-rolling mill for aluminium.

A further item of interest is the replacement of a flywheel motor generator set on a reversing billet mill by a synchronous motor generator set. The former set had been in operation for nearly 30 years and was due for replacement. It was considered that the line peaks involved did not justify equalisation by means of a flywheel, and a synchronous motor drive for the set was therefore adopted.

The British Barytes Market

A Canadian View

BRITAIN'S requirements of barytes have been the subject of a report by Mr. A. E. Bryan, Canadian Trade Commissioner, which was published recently in the *Commercial Intelligence Journal* of the Dominion Department of Trade and Commerce. Particularly interesting are the views of several British manufacturers and importers, which Mr. Bryan records, as to the market prospects of Canadian barytes in this country.

Most of the barytes used in Britain goes into the manufacture of lithopone and paint. Mr. Bryan states that two large British firms manufacture lithopone; their combined production is estimated at 35,000 tons a year, with a required annual consumption of 20-25,000 tons of barytes. Both firms own their own barytes mines, but they also import a considerable tonnage of crude ore from abroad, at present chiefly from Ireland and formerly from the Continent. These two firms are interested only in lump barytes, as they have all facilities for crushing and mixing. The barytes ore for making lithopone must contain not less than 90 per cent. $BaSO_4$. To satisfy normal requirements of the paint trade about 50,000 tons of powdered barytes are needed each year. Most of it used to be imported from Germany and Italy, though Algerian barytes was coming into use just before the war.

Next largest consumers of barytes in the United Kingdom are the chemical industries, with a weekly requirement of about 1800 tons of crude ore. Large quantities of "blanc fixe" are used by the paper-coating industry; at present paper manufacturers are allowed only one-tenth of the normal annual requirement; as otherwise there would be a severe shortage for more essential purposes. The coal-washing industry absorbs about 5000 tons annually, at the rate of 2 lb. of off-colour barytes for every ton of coal washed. Rubber manufacturers use about 1500 tons a year.

Post-War Opportunities

A number of authorities whom the Canadian Trade Commissioner consulted—some of whom had had the opportunity of examining samples of Canadian barytes—were of the opinion that there will be good opportunities for developing the sale of the Canadian product in Britain after the war. At present, owing to import restrictions and the shortage of shipping space, local consumers have to rely on home-produced barytes and substitutes (mostly clays), together with some 2000 tons imported annually from Ireland. Consumption of barytes is currently restricted by the Ministry of Supply, priorities being established in the following order: coal-washing, chemical manufacture, rubber manufacture, lithopone manufacture, paper making, essential paint, other uses.

Mr. Bryan remarks that the fact that, despite the greatly increased domestic output and the imports of ground barytes from Ireland, British industry has been short of barytes at a time when the general volume of non-essential consumption has been eliminated, is indicative of the volume of the business that must develop after the war to satisfy the total British requirements, and Canada should be an important source of supply.

An Industrial Chemist's View

The report quotes the statement of one of Britain's largest chemical manufacturers to the effect that although he was going to do everything possible to foster the development of British barytes deposits, particularly his own two mines, he was firmly convinced that domestic deposits would not be able to supply the requirements of the United Kingdom after the war. For that reason he was always in the market for new supplies and wished to encourage Empire producers. He added that, owing to the geographical location of Canadian deposits, especially those in Nova Scotia, which are right at tide-water, he considered that these were likely to be the mainstay of such companies as his own, provided the quality was suitable. Engineers who have examined the barytes deposits at Benbulben, Sligo, which are likely to be enlarged and further developed, have expressed the opinion that they will be unable to compete with Nova Scotia barytes, which can be so easily mined from surface deposits in large quantities. In addition the cost of transportation from the mine to ships in Nova Scotia is likely to be lower than the corresponding costs to vessels from Benbulben. Moreover, it is improbable that the mines in Ireland will produce as much per individual worker as will be produced in Canada and, if transhipment can be eliminated, the freight from Canada to United Kingdom ports is not likely to be proportionate to the difference in mileage.

Another producer of chemicals, continues the report, said that he would be prepared to use Canadian barytes (which he had not had an opportunity of examining) as a raw material for his chemical processes, provided the $BaSO_4$ test gave not less than 95 per cent. Moreover, he could not rule out the product, even though an oil-coloured type, as unsuitable for bleaching. His

present supply, a British barytes, is characterised by a reddish tinge, but he has a process for treating it and entirely eliminating the colour to produce a first-quality white grade. If he could obtain a trial shipment of, say, 200 tons of Canadian barytes, he would be prepared to make some bleaching tests which should have just as satisfactory results as are obtained from the product he is using at present. He proposes to visit Canada immediately after the war for the purpose of inspecting these newly established barytes developments. This particular company has a consumption capacity of 500 tons of barytes a week.

A large distributor and importer of heavy chemicals and substitute clays stated that "the quality of this Canadian barytes is satisfactory for a large percentage of work in this country, provided the price will not rule it out. As the home producer cannot supply anything like the quantity required, and as our own substitutes, although very useful, will not do for certain work, imports of barytes are therefore essential." One of the most important firms importing from Italy before the war wrote: "We have been importing from Italy, and Canadian samples must be of equal colour and grading, or even more finely ground. There is a good market for the right material at competitive prices. There is also a large demand for crude (lump) barytes, but cost is the main factor."

Another firm was of the opinion that, owing to the increased quantities of paint that will be required after the war and to the additonal needs of the rubber, paper, and chemical trades, the imports of barytes will show an increase of 50 per cent. over pre-war figures.

Colloidal Iron Problem

Another important firm importing minerals of all kinds, after testing samples of Canadian barytes, wrote: "At present we are handling a recovered British grade which is of a fine white colour, although the $BaSO_4$ content is 20-25 per cent. lower than the Canadian quality. It costs £10 10s. a ton, so that the Canadian product is at a disadvantage if colour is one of the stipulations. On the other hand, where colour is of secondary importance the Canadian grade might be of interest, seeing that the Canadian $BaSO_4$ content is of the high rating of 95-97.5 per cent." A London chemical concern, after examining samples from Canada, reported as follows: "We fear that the colloidal iron present, which gives the material a distinct reddish tone in the powdered form, would preclude the use of the powdered material to any great extent in the paint or rubber trade, except for red and brown paints. Possibly the redness would not affect the material from the point of view of its use for lithopone manufacture. It is for that purpose that crude barytes is mainly needed over here at present, but from that angle the shipping-space question has to be considered, and we do not suppose any shipping space would be granted for barytes under present conditions. We are interested in barytes mainly after bleaching or acidulation."

Italian and German Barytes

The report concludes by referring to Britain's pre-war imports of this material. It remarks that probably Germany had built up the best reputation for good-quality barytes before the war. German firms could furnish any one of six standard grades, and consumers could always rely on shipments being equal to grade samples. Italian barytes was available in four grades, which were usually found satisfactory by the trade in the United Kingdom. There is no need, comments Mr. Bryan, for Canadian producers to adopt so many grades. It might be better to start off with three standards, which should be sufficient for this market, and these Canadian standards should be the equal of the German first, second and third grades or the Italian "Super," "Extra," and "33" qualities.

Plastics in Scotland

A "Reconstruction" Industry

THE development of a plastics industry in Scotland after the war was predicted by Mr. E. Gibson Knight, managing director of Scottish Plastics, Ltd., Leslie, Fife, in a recent address to the Glasgow Publicity Club. Mr. Knight said that Scotland had produced, or could produce, many of the most important basic materials for the manufacture of plastics, and it was to be hoped that the opportunity to do so would be seized. It was not too much to hope that in post-war reconstruction we might see established in Scotland such industries as radio manufacture, and other light electrical industries, on a substantial basis.

There had probably been more controversy over the question of plastics for building purposes than for any other development of these materials. On the one hand there was talk about the plastic house, conveying the impression that "super moulds" would be set up in plastics factories from which walls, floors and roofs of houses would tumble out all ready to be put together by unskilled labour. On the other hand, there were those who claimed that plastics could do practically nothing for the building industry. The truth was midway between those two. It was his opinion that the internal fitments, and probably partitions, would be largely constructed of plastics in the very near future. With its resistance to steam and its simplicity of cleaning it was bound to make headway in these directions.

Mineral Wool from Colliery Waste

An American Development

From a Correspondent

MINERAL wools are now being much used by the U.S. Services, especially in the newer types of naval craft. Their advantages, including the fact that they neither deteriorate nor decay and afford no harbourage for vermin, account partly for this increasing demand. Mineral wool produced from anthracite colliery refuse or anthracite ashes on a commercial scale is a result of research carried out by the Anthracite Industries Fellowship at the Mellon Institute of Industrial Research, U.S.A. Broadly, the processing of mineral wool may be defined as melting suitable raw materials in cupola or other furnaces and subjecting the resultant molten mass to the disintegrating effect of high-pressure steam or air. Propulsion by this means causes the molten slag globules to be drawn out into fine-diameter fibres; the "shot" is removed by screening, and the finely divided "wool" then becomes available for processing into insulating materials.

Melting-Point Tests

Compared with metallurgical slags or the natural materials generally used, anthracite ash is comparatively refractory. The ash consists largely of silica and alumina, but it is found that the addition of a suitable flux, usually limestone, enables a fluid glass to be produced, and this provides a white mineral wool of quite high physical standard. In laboratory tests, cones of carbon-free ash and lime (CaO) were used; the ash was derived from colliery refuse or from stoker-fired anthracite industrial boilers. The cones were gas-fired until melting-points were ascertained, a typical fluid temperature being 1245°C. for a mixture of boiler ash with 30 per cent. lime. The percentages of lime for given fluid temperatures are not critical within 5 per cent. Analysis of commercial wools indicates a fairly wide range in the ratio of acid/basic constituents.

As raw material, anthracite colliery refuse or industrial ashes contain enough combustibles to supply a substantial part — 3000 to 5000 B.Th.U. per lb. — of the requisite processing heat. Plant was therefore designed to raise steam for wool blowing and to utilise the potential heating power of colliery refuse for melting. The furnace used combines, in principle, the operations of a blast furnace and a slagging gas producer, and will produce 100 lb. of mineral wool per square foot of hearth area per hour, a mixture of colliery refuse and limestone being charged to the furnace from above, while combustion is accelarated through blower air pressure. Small amounts of steam are used both to control temperature and to adjust composition of the furnace-produced fuel gas. Molten slag collects at the furnace base and flows, in restricted streams, into high-pressure steam jets, to settle afterwards as mineral wool on the floor of the attached "wool room."

For practical reasons, in the location in the U.S.A. where the process is to be operated, it is proposed to use colliery refuse direct from anthracite breakers; it will be economic to pay for raw material of the desired character, uniform size, and specified carbon content; and limestone quarries are working within a few miles of the anthracite breakers. Costs of manufacture are interesting: anthracite refuse is reckoned to cost about $1 a ton at the plant, and production of loose wool is estimated to be 20 per cent. cheaper than slag wool or 50 per cent. cheaper than rock wool, these costs being naturally based on the size of plant and output. As the material is bulky, freight is a factor to be reckoned with in locating plants. However, those who conducted the initial research, which was on a semi-industrial scale, are emphatic that the process ha attractive commercial possibilities and thus merits serious consideration.

Research at the Colliery

Powell Duffryn's Achievements

IN an address delivered at Cardiff recently, Dr. W. Idris Jones, head of the research department of Powell Duffryn Associated Collieries, Ltd., spoke of the tremendous developments made possible in industrial and social life by scientific research. In view of the allegations of backwardness in research that had been levelled at the South Wales coal industry recently, Dr. Jones referred more particularly to the activities of his own company. It was the first firm, he said, to set up a private research department in this country. Its briquetting plant, making about 500,000 tons per annum of block fuel and nearly 100,000 tons per annum of carburised briquettes, was the only plant of its kind in Britain, and was based on a process developed in the company's laboratories. The coal washeries dealt with 3000 tons of coal an hour, and the special plants for the recovery of fine coal from washery effluents were so efficient that there were hopes that Welsh rivers might be re-converted into trout and salmon streams. The Powell Duffryn Company was not one of the "dead-end kids," as suggested in Cardiff recently.

The Swedish cellulose combine, Svenska Cellulose A/B, has transferred 20 million kronor from its share capital to reserve, at the same time increasing the share capital to 50 million kronor by the issue of new shares.

Parliamentary Topics

Penicillin

IN the House of Commons last week, Mr. Robertson asked the Minister of Supply why his Department was obstructing the visit to the U.S.A. of Mr. Gormley, of International Chemical Co., Ltd., London, whose associated companies in Canada and the U.S.A. ranked as the largest manufacturers of penicillin and who were prepared to put all their knowledge and experience at the disposal of the British company so that large-scale manufacture of penicillin could start at the earliest moment.

Mr. Peat replied that Mr. Gormley had sought the support of the Ministry of Supply for an exit permit to visit North America for the purpose of investigating penicillin production and for certain other purposes. In the absence of evidence that his visit would be likely to increase supplies of penicillin, he did not feel able to support Mr. Gormley's application. Technical experts were already visiting penicillin plants and mould-culture establishments in America and the information they obtained as to processes and equipment would be made available to any manufacturers in this country who satisfied the Ministry of Supply that they were in a position to undertake the production of penicillin.

Mr. Robertson further asked whether it was not a fact that the Department had granted a virtual monopoly of penicillin to three or four firms only, that their output was disappointing—not 1 per cent. of the demand. Mr. Peat denied that they had granted a monopoly to three firms. The production of penicillin at present, he said, was in its infancy and at the experimental stage. Patent rights and any other developments which might occur during the war, had been pooled and would be made available to any manufacturer who was in a position to make penicillin.

Portuguese Tin

In reply to a question last week which Mr. A. Edwards asked the Parliamentary Secretary to the Ministry of Economic Warfare, Mr. Foot said that in 1942 Portugal exported to Axis Europe 1165 metric tons of tin metal, of which 757 tons were consigned to Germany, 398 tons to satellite countries, and 10 tons to Luxemburg. She also exported to Germany 10 tons of tin concentrates. His department estimated that the total quantity exported in 1943 was approximately the same. He had no precise information as to how far Portuguese commercial agreements with countries in Axis Europe covered the export of tin.

German Control in Spain

Mr. A. Edwards also asked for any information as to the extent to which German capital had succeeded in penetrating directly and indirectly into Spain; and what degree of control the enemy exercised over the Spanish shipbuilding, mining, iron and steel, chemical and road transport industries, respectively.

Mr. Foot stated that he had received in recent months considerable evidence of German infiltration into Spanish industry. Spanish law prohibits the acquisition by foreign companies of controlling interests in Spanish companies. German infiltration, however, takes the form of making available processing and patent rights and supplying technical plant, advisers and engineers. It is not possible to assess with exactitude the degree of control obtained by such methods over the industries mentioned in the second part of the question.

Supplies from Sweden

Sir A. Southby inquired about supplies going from Sweden to Germany. Mr. Foot replied that Sweden had been exporting substantial quantities of iron ore, wood and wood pulp, paper, machinery, ball and roller bearings to Germany. During the latter half of 1943 there was a marked reduction in some of these exports, and the recent German-Swedish Trade Agreement provided for still further reduction.

Substitute Fuels

Mr. A. Edwards asked the Lord President of the Council whether any research work was now being done in order to utilise this country's coal resources for the production of substitute fuels other than synthetic fuels.—Mr. Attlee: Yes, sir. I may add that some of these fuels are now being used with satisfactory results on a large scale.

CHEMISTRY IN CHINA TO-DAY

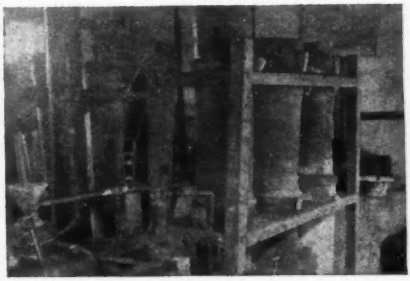
ON the opposite page we publish a few illustrations depicting the progress of chemistry in Free China in war time. For these we are indebted to Dr. Joseph Needham, F.R.S., head of the British Scientific Mission in China, and to the Sino-British Science Co-operation Office, the photographs having been transmitted to England through the medium of the British Council. These and many other photographs will, it is hoped, be published before long in an album of pictures to be entitled "Science and Technology in War-Time China."

Chungking University chemical laboratories.

National Central University chemical laboratories.

Inside a chemical reagents factory at Supochiao.

A chemical factory, somewhere in Szechuan.



Back to the technique of Robert Boyle, perforce. Making insecticides at a Szechuan Agricultural Station.

Chinese Chemical Society lunching at the National Institute of Industrial Research, Beipei.

CHEMISTRY IN CHINA TO-DAY

Personal Notes

DR. WILLIAM CULLEN succeeds Professor Frederick Soddy, F.R.S., as president of the Science Masters' Association.

MR. H. W. ROWELL, first honorary secretary of fthe British Association of Chemists, has been nominated by the Medal Committee as the recipient of the Hinchley Medal for 1943/44.

SIR HAROLD SPENCER JONES, the Astronomer Royal, has accepted the invitation of the Council of the Institute of Metals to deliver this year's May Lecture. He has chosen as his subject "Metals in the Stars."

MR. LEWIS S. MUNSON, production superintendent and later plant manager of the Du Pont Dye Works, has retired at the age of 70, after 25 years with the company. Mr. Munson played an important part in building the great American dye industry, and his career spans the growth of America's synthetic organic chemicals industry.

At the last council meeting of the Society of Chemical Industry, PROFESSOR E. K. RIDEAL accepted the invitation to become president for the coming year. The chairman, Dr. William Cullen, announced that Professor Rideal would serve on the Chemical Council as from January, 1944, and that SIR SHANTI BHATNAGAR had accepted the vice-presidency.

MR. A. G. EDISON, identified with the design and operation of the Du Pont nylon plants from the beginning of this material's development, has been appointed technical manager in the company's nylon research section. Mr. Edison was responsible for the pilot plant making the first hexamethylene diamine, one of the two principal chemicals required in nylon manufacture.

During the past six weeks four British workers have been travelling across the United States, describing the British war effort to American workers and being shown many aspects of American war production. Among them are MR. JOHN GEORGE CLARK, a rail transport supervisor from the I.C.I. plant at Billingham, and MR. JOHN HENRY JONES, who has been with the Lancashire Steel Corporation for 30 years. Mr. Clark has visited chemical works in Missouri, Illinois, Michigan, and Ohio, while Mr. Jones has been spending most of his time at the steel works in Pennsylvania and New Jersey. To judge from an interesting dispatch published in Monday's *News Chronicle*, this mission is proving a great success.

Obituary

PROFESSOR ALFRED STANSFIELD, D.Sc., F.R.S.C., A.R.S.M., whose death at Montreal on February 5 is reported, was Professor of Metallurgy at McGill University from 1901 to 1936. Born in Bradford in 1871, he received his training in metallurgy at the Royal College of Science and the Royal School of Mines, where in 1898-1901 he was in charge of the metallurgical laboratories. He was particularly noted as an authority on the ores of iron, copper, and zinc, and in 1915 was on a Canadian Government commission to investigate the production of refined copper and zinc in Canada. His researches and publications on the electric smelting of iron ores were of the highest importance. In 1928, he became vice-president of the American Electrochemical Society.

The death occurred on February 4 of MR. JAMES MCCONNELL SANDERS, F.I.C., F.C.S., aged 69, at his home at Pinner. He trained under Snape at Aberystwyth, and his first post was with Burroughs Wellcome & Co. For a time he was in charge of the manufacture of "Tabloid" photographic reagents, and he then transferred to Dr. F. H. Carr's department which dealt with the preparation of alkaloids and other fine chemicals. In 1900, ill-health forced him to resign this position and he went to Mexico to recuperate. A short time afterwards he was appointed chief chemist to the Mexican Customs Department. Later he coupled this work with the additional duty of organising the Department of Applied Chemistry and Technological Research which the Mexican Government had started in the National Medical Institute. During this period he published many papers on a great variety of subjects, ranging from plant drugs to Mexican textiles. In 1908 he joined the Institute's staff, being given, by the Department of Public Instruction, the post of Professor of Applied Chemistry. Seven years later he became chief refinery chemist to the Mexican Eagle Company, and the rest of his life was spent in petroleum chemistry, his last post being with Asiatic Petroleum. He was a vice-president of the Institute of Petroleum.

LETTER TO THE EDITOR

Silicon Bronze Alloys

SIR,—We have read with interest the short article on Silicon Bronze Alloys, which appears in the issue of your publication dated February 5. We have also published some short notes dealing with Silicon Bronzes. These appear in our Information Sheet No. 12, and in "Foundry Practice No. 66." Should any of your readers be interested in these notes we shall have much pleasure in supplying copies as required.—Yours faithfullly,

for FOUNDRY SERVICES, LTD.,
J. L. FRANCIS.

February 7, 1944.

General News

From Week to Week

The Minister of Agriculture has arranged for the import from the U.S.A. of six modern mills for grinding limestone and chalk for use on farmland.

Nine candidates were successful in the January examination in general chemistry for the Associateship of the Royal Institute of Chemistry.

A four-page pamphlet describing the welding of aluminium and its alloys by the Electric Arc Process is available from Murex Welding Processes, Ltd., Waltham Cross, Herts.

The fire at Heapey Bleach and Dye Works led to a question in the House, and the reply from the Minister of Home Security that he had no knowledge that the premises were deliberately fired.

The Ministry of Food announces that there will be no change in the existing prices of oils and fats allocated to primary wholesalers and large trade users during the four weeks ending March 4.

The engineering firm of Rhodes, Brydon & Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport, inform us that they have a small surplus of their desk-pad diaries. Copies will be sent on request.

The working of any known deposit of iron ore in the vicinity of Millom and Askam that is at present unworked would not justify the time and labour involved. This reply was given in the House by Mr. Lyttleton in answer to a question from Mr. E. Smith.

Asphaltic bitumen is to be released in sufficient quantities to enable local authorities to tackle road maintenance during the spring. A war emergency specification for asphalt roads has been set up by the British Standards Institution, in response to the Government's urgent request for economy.

Recent activities of the Fuel Efficiency Committee include the issue of a new bulletin (No. 28) on Flash Steam and Vapour Recovery, and the publication of two Boilerhouse Posters (size 20 in. by 30 in.) comprising outline diagrams with numbered hints for maintaining fuel efficiency.

A demand for greater attention to be paid to science and vocational training in our schools was put forward by the National Federation of Professional Workers at its annual conference last week-end. The meeting took the view that the Government's White Paper on education showed a grave lack of understanding of the place of science in our national life. A substantial increase in facilities for technical education was urged, with adequate day continuation courses to replace all vocational evening courses.

Camouflage paints that reflect infra-red rays may be used after the war to reduce the heat absorption of painted surfaces, and so help to keep buildings cool though the sun is shining. This suggestion is made by S. J. Cook, writing in *Chem. and Eng. News*.

A disastrous fire at the plant of Tar Distillers, Ltd., Pinxton, Notts, destroyed the anthracene, naphthalene, and acid recovery sections. The neighbouring plant of the Notts and Derby Coke and By-Product Co., Ltd., was in no way affected by the fire, the cause of which is at present unknown.

The maximum amount for which a single Inland Money Order payable in the United Kingdom may be issued was increased from £40 to £50 on February 1. Poundage payable on orders for amounts between £40 and £50 is 1s. 2d. The maximum for money orders payable in Eire remains at £40.

The use of cyanide gas for killing rabbits was mentioned in the House of Commons last week. Mr. Robert Morrison suggested the method entailed wastage of food, but the Minister of Agriculture replied that he was satisfied the damage done by this pest overrides any consideration of their food value.

A fire at the paint works of Walter R. Taylor & Co., Ltd., Forth Street, Liverpool, recently, caused damage amounting to several thousand pounds. The outbreak was discovered by a fire watcher, but by the time the fire brigade had arrived the place was a blazing inferno.

The British Standards Institution has published a booklet entitled "Office Organisation and Practice," which gives useful information on the practical technique of office and clerical organisation. While the document is principally directed to firms with 250-1000 employees, smaller firms will find much in it to interest them.

H.M. Stationery Office has published the following M.A.P. specifications: Sulphuric acid for accumulators (No. 154A, superseding No. 154, and incorporating Amendment List 1), price 6d.; aluminium alloy sheets and coils, solution-treated (No. 603), 1s.; high-tensile aluminium alloy sheets and coils, solution-treated and artificially aged (No. 646), 1s.

Applications are invited by the trustees for Leverhulme Research Fellowships and Grants in aid of research for 1944. The Fellowships and Grants are intended for senior workers prevented by pressure of other duties from carrying out research. Forms of application and fuller particulars may be obtained from the Secretary, Dr. L. Haden Guest, M.C., M.P., Leverhulme Research Fellowships, Unilever House, Blackfriars, London, E.C.4.

Cultivation of sunflowers as a seed crop in Britain is described by Mr. G. E. Blackman in the February issue of the Ministry of Agriculture's journal. Experimental sowings during the past three years indicate that English conditions are especially suitable for its growing. Yields have ranged from 10-20 cwt. of seed an acre, with oil contents of 30-36 per cent. of the dry weight.

The financial affairs of the Empire Exhibition that was held in Glasgow have now been wound up. The Earl of Elgin, who presided, praised the patriotism and public spirit of the creditors, the great majority of whom had met the calls made on them, and had, moreover, agreed that the small refund they received should go into the funds of the Exhibition's continuing body, the Scottish Development Council.

Foreign News

Sulphanilamide, for self-medication, is being carried by U.S. troops in heat-sealed paper packages coated on the inside with waterproof vinylite resin, which is non-toxic.

A large gravity milling plant for tungsten production has been built by the Nevada-Massachusetts Company at Mill City, Nevada, U.S.A.

Three million pounds of usable optical glass have been produced by the American firm, Bausch & Lomb Optical Co., since Pearl Harbour.

An American-built Liberty ship has been named "Charles H. Herty," in honour of the chemist who was president of the American Chemical Society in 1915-16.

Production and shipment of refined lead in the U.S.A. declined 10 per cent., in 1943, states Reuter, whereas the production of spelter broke all records. Copper is not to be released for civilian use for the time being.

Coke from peat is being made in Russia by a process perfected at the Central Experimental Station, Moscow. It is claimed that this coke can be used to replace coal-coke in iron and steel manufacture and that it is also a substitute for charcoal.

The U.S. Bureau of Mines calls attention to the dangers that attend the handling of zirconium metal. A cloud of it is capable of spontaneous ignition and explosion at room temperature, it is stated. The Bureau recommends that the metal be used either as a sludge or in special containers.

A special textile panel is being set up in Australia to inquire into the question of establishing a textile college and providing research facilities to help wool to hold its place in the textile trade. This was disclosed by Mr. W. J. Scully, Australian Minister of Commerce and Agriculture, at a conference called to discuss the menace of synthetics to the wool industry.

A research unit of America's Office of Research and Development, investigating the problem of supplying water for shipwrecked persons, found it was possible to mix sea and fresh water for drinking purposes, but the ratio had to be adjusted so carefully that the system proved over-complicated.

The capture of Nikopol, announced by the Russians on Tuesday evening, deprives the Germans of nearly half of their available sources of manganese. This will be a severe blow to Nazi steel production, and, coupled with the renewed blows from the air on Frankfort, the nerve centre of the I.G. trust, may well have a decisive effect on Germany's front-line supplies.

A list of standard symbols has been drawn up by the American Standards Association, 29 West 39th Street, New York, and published as a book costing 55 cents and entitled "Letter Symbols for Heat and Thermodynamics, including Heat Flow." This work is the outcome of a project for the standardising of scientific and engineering symbols initiated by the American Association for the Advancement of Science, and the American engineering societies.

Forthcoming Events

The **Chemical Society** and the **Royal Institute of Chemistry** are holding a joint meeting in Cardiff at 3.30 p.m. on **February 12,** in University College, Cathays Park, when Dr. H. B. Watson will present a paper on "The Study of Reaction Mechanism."

At the meeting of the **North of England Institute of Mining Engineers** on **February 12,** at 3 p.m., in the lecture theatre of the Mining Institute, Newcastle-upon-Tyne, Lord Eustace Percy will lecture on "Education and Industry."

A lecture in English on "Coal as a Source of Chemicals," will be given to the **Association of Austrian Engineers, Chemists and Scientific Workers,** by Dr. E. Spencer, at the Austrian Centre, Swiss Cottage, on **February 14,** at 7.15 p.m.

The **Institute of Fuel,** Birmingham section, is holding an informal discussion on "Mechanical Draught Applied to Steam Boilers," at the James Watt Memorial Institute, Great Charles Street, on **February 16,** at 2.30 p.m.

Dr. T. F. West will read a paper on "The Pyrethrins and the Rôle of Pyrethrum in Anti-Pest Measures" to the Microbiological Panel of the **Society of Chemical Industry,** at its meeting in the rooms of the Chemical Society, Burlington House, London, on **February 16,** at 2.30 p.m.

On **February 16,** at the **Royal Institute of Chemistry,** 30 Russell Square, W.C.1, at 5 p.m., a lecture will be given by Dr. B. A.

Southgate, F.I.C., of the Water Pollution Research Board, on "Recent Advances in Treatment of Sewage and Trade Waste Water." Visitors will be welcome at this meeting, arranged by the London and S.E. Counties section of the Institute.

A lecture on "Chemotherapy in Tropical Medicine" will be given to the **Chemical Society**, at 2.30 p.m. on **February 17**, by Dr. A. J. Ewins, F.R.S., at Burlington House.

The 26th annual general meeting of the **British Association of Chemists** will be held at the Café Royal, Regent Street, London, W.1, on **February 19**, at 2.30 p.m. The chair will be taken by Dr. A. E. Dunstan, president of the association.

The **Association of Scientific Workers**, N.W. Area Committee, has arranged an exhibition to illustrate the subject of "Chemicals in War and Reconstruction," and this will be opened by the Lord Mayor of Manchester on **February 19**, at Manchester Central Library. The exhibition, which will remain there until March 4, will show by photographs, diagrams, etc., the importance to the community of heavy chemicals, coal gas, plastics, rubber, petroleum products, textiles, paint and medicines.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

INSULATING MATERIALS, LTD, Widnes. (M., 12/2/44).—January 22, by order on terms, £1800 mortgage dated July 2, 1939, to M. T. Heyes, Winsford, and ano.; charged on Park Works, Appleton. *£1800. March 12, 1943.

L. B. HOLLIDAY & CO., LTD., Huddersfield, chemical, colour, etc., manufacturers. (M., 12/2/44).—December 29, agreement, securing £5000; charged on boiler house with plant, etc., on land at Deighton, Huddersfield. *£260,032. November 22, 1943.

Company News

Universal Asbestos Manufacturing Co., Ltd., announce a profit of £112,401 (£114,304), for the year ended October 1, and are paying a dividend of 20 per cent. (same).

The Egyptian Salt and Soda Co., Ltd., announces a net profit of £E262,995 (£E179,311) for the year ended August 31. Gross dividend for the year is 25 per cent. (30 per cent.).

New Companies Registered

Isaac Mason and Son, Ltd. (385,289).—Private company. Capital: £2000 in 2000 shares of £1 each. Dealers in paint, varnish, enamel, lacquer, oil, plastic products, etc. Subscribers: C. J. Bennett; E. G. Wilshire. Solicitors: Flint, Bishop and Barnett, 42 Full Street, Derby.

J. R. P. (Plastics), Ltd. (385,219).—Private company. Capital: £500 in 500 shares of £1 each. Manufacturers of and dealers in plastics, chemicals, gums, varnishes, etc. Directors: J. R. Pritchard; Mrs. H. M. Pritchard. Registered office: 306 Westbourne Grove, London, W.11.

Powdered Metals Development (Holdings), Ltd. (385,316).—Private company. Capital: £1000 in 1000 shares of £1 each. To acquire all or any of the issued shares of Powdered Metals Products, Ltd. Directors: C. G. Wade; J. G. Campbell; R. Hunter; J. R. Rotheroe; H. A. L. Richardson; R. H. Spiers. Registered office: 13 St. George Street, Hanover Square, W.1.

Campbell Metallurgical Development Co., Ltd. (385,284).—Private company. Capital: £5000 in 5000 shares of £1 each Manufacturers, workers, refiners and merchants of metal, metal alloys, powdered metal products, chemicals, vulcanite, ebonite, etc. Directors: C. G. Wade; J. G. Campbell; R. Hunter; J. R. Rotheroe; H. A. L. Richardson; R. H. Spiers. Registered office: 13 St. George Street, Hanover Square, W.1.

High Therm, Ltd. (384,583).—Private company. Capital: £100 in 100 shares of £1 each. To acquire the right to exploit certain inventions relating to steam-raising apparatus, to carry on the business of metallurgists, chemists, research and scientific workers, etc. Directors: C. E. Styles; C. F. Styles; Wing-Commander W. Barnato; L. C. Edwards. Registered office:: 77 New Bond Street, Birmingham 9.

De La Rue Insulation, Ltd. (385,216).—Private company. Capital: £300,000 in 300,000 shares of £1 each. To acquire (1) that branch of the business of De La Rue Plastics, Ltd., which comprises the manufacture, use and sale of laminated insulation material and laminated board, and (2) all or part of the assets, liabilities and undertakings of Hammans Industries, Ltd., the Hamofil Manufacturing Co., Ltd., and Insulande, Ltd. Subscribers: A. J. Penwarden; A. Byron. Registered office: Avenue Works, Walthamstow Avenue, E.4.

Powdered Metal Products, Ltd. (385,317).—Private company. Capital: £10,000 in 10,000 shares of £1 each. Manufacturers, workers, refiners and merchants of metals, metal alloys, powdered metal products, chemicals, powdered metal, vulcanite, waste and scrap dealers, engineers, etc. Directors: C. G. Wade; E. G. Walford; R. Hunter; J. R. Rotheroe; H. A. L. Richardson; R. H. Spiers. Registered office: 13 St. George Street, Hanover Square, W.1.

Chemical and Allied Stocks and Shares

STOCK EXCHANGE markets have been steady, but were again inactive in most sections. British Funds maintained their improved tendency, and, although less active, industrial shares were not without various individual features. Imperial Chemical at 38s. were virtually unchanged as compared with a week ago, as were Borax Consolidated deferred at 37s. 9d.; general expectations are that the dividend of the last-named company will be kept at 7½ per cent. Turner & Newall were good, and at 79s. have moved slightly higher on balance. B. Laporte continued to be quoted at 75s. "middle," and W. J. Bush at 60s., but owing to inactive markets, quotations have not been tested adequately by dealings. Dunlop Rubber were slightly higher at 40s. 6d., and elsewhere, small fluctuations continued to be shown in Triplex Glass 10s. ordinary, which are 37s. 7½d. at the time of writing.

In other directions, Wall Paper deferred eased further from 37. 9d. to 37s. 6d., but there was a firmer tendency in the units of the Distillers Co. at 89s., and in United Molasses 6s. 8d. units at 31s. 9d. British Aluminium were steady at 47s. 9d., as were British Oxygen at 80s. 6d. Barry & Staines remained at 44s., and Nairn & Greenwich at 70s. Lever & Unilever continued steady at 33s. 6d. British Drug Houses were 23s., and Burt Boulton 22s., while Greeff Chemicals 5s. ordinary were again 7s. 3d., and Monsanto Chemicals 5½ per cent. preference 23s. Cellon 5s. ordinary also remained at 23s. and, awaiting the dividend statement, International Paint held their recent rise to 115s. Lewis Berger showed firmness and rose further to 97s.

Among plastics, British Industrial 2s. ordinary were 6s. 9d., and Erinoid 5s. ordinary again 10s. 9d. Lacrinoid Products 2s. ordinary kept at 4s. 6d., while De La Rue ordinary were 157s. 6d. British Plaster Board 5s. ordinary maintained their improvement to 29s. 6d., and Associated Cement were steady at 63s. 6d. In the iron, steel and kindred sections, Stewarts & Lloyds at 53s. 9d. were little changed on balance. Dorman Long were 28s. 9d., Staveley 50s. 3d., United Steel again 24s. 3d., and Richard Thomas 6s. 8d. ordinary 9s. 6d. Tube Investments strengthened further to 96s. 3d. Babcock & Wilcox at 49s. 9d. were virtually the same as a week ago, as were Allied Ironfounders at 49s. 9d. Gas Light & Coke at 20s. 6d. were little changed in price, awaiting the impending dividend announcement. R. A. Lister were 78s. 6d., aided by the good impression created by the recently-issued results, which showed earnings of 36½ per cent. on the ordinary shares, the dividend on which has again been limited to 16 per cent., thus permitting a substantial proportion of the profits to be used to add further strength to finances by increasing reserves.

Blythe Colour 4s. shares have changed hands at 9s. 3d., and British Tar Products 5s. ordinary around 10s. Canning Town Glass 5s. ordinary were 8s. 9d. and tended to be more active on the possibility of a slightly higher dividend for the past year. United Glass Bottle were again 60s., and Forster's Glass 10s. ordinary 31s. 3d. Awaiting the financial results, Fisons remained at 47s. 6d. "middle"; dealings ranged up to 48s. 6d. General Refractories were 16s. 10½d., and Imperial Smelting 13s. 3d. Goodlass Wall 10s. ordinary showed firmness at 17s. Among textiles the tendency was easier in accordance with the general market trend. Bradford Dyers were 21s. compared with 21s. 9d. a week ago, and Calico Printers eased to 16s. British Celanese moved back from 27s. 3d. to 26s. 6d. but, contrary to the general tendency, Courtaulds improved on balance from 52s. 6d. to 53s. Boots Drug strengthened from 42s. to 42s. 6d. pending the interim dividend, while Sangers were little changed at 23s. 7½d., and Timothy Whites improved to 33s. Oil shares reflected the easier market conditions. Anglo Iranian were 109s. 4½d., compared with 110s. 1½d. a week ago.

British Chemical Prices

Market Reports

A SUSTAINED activity has been reported from most sections of the London chemical market during the past week, and delivery specifications continue to cover good volumes. There has been no alteration in the general supply position and new bookings are mostly in the nature of contract renewals. Values remain firm throughout the market. There is a good call for the majority of the soda products and a strong demand is reported for supplies of caustic soda, bicarbonate of soda, prussiate of soda, and soda ash. Glauber salt and salt cake are steady. In the potash section, permanganate of potash is firm and in good request, while caustic potash and

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bichromate of potash continue scarce. Makers' prices for citric and tartaric acids are unchanged, but there is little material available of either product. Oxalic acid remains strong. A fair activity is reported from the coal-tar products market, interest being mainly centred on creosote oil and carbolic acid.

MANCHESTER.—Deliveries against orders placed some time ago form the bulk of the current movement of chemical supplies on the Manchester market. During the past week there has been fresh inquiry in circulation, but not a great deal of really important new buying. Supplies of a fairly wide range of chemicals are finding a steady outlet to the textile bleaching, dyeing and finishing trades, and most other consumers are fully maintaining their contract demands. The potash compounds are mostly in very short supply. Caustic and other soda products are meeting with a good demand, and a steady trade is passing in the acids. Both light and heavy coal-tar products are being absorbed in substantial quantities, mostly at the controlled levels.

GLASGOW.—In the Scottish heavy chemical trade there has been a steady demand during the past week for home business. Export trade remains very restricted. Prices keep very firm. There is an advance in certain commodities owing to additional on-cost charges.

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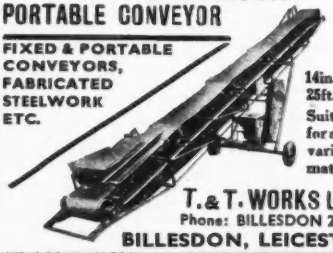

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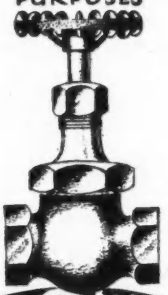

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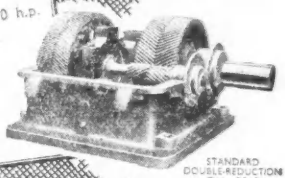

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